MATH 125 FINANCE HANDOUT
HOMEWORK SOLUTIONS

1. A) Use I=Prt with P=10,000, r=0.06, t=8: I=(10000)(.06)(8)=$4800
B) The amount in the account is P + I = 10000 + 4800 = $14800

2. A) Use compound interest: \( A = P \left( 1 + \frac{r}{m} \right)^{mn} \) with P=10000, r=0.06, m = 1 (annual), n=8
   \[ A = 10000 \left( 1 + \frac{0.06}{1} \right)^{8 \times 1} = 15,938.48 \] Total amount in the account.
   B) \( I = A-P = 15938.48-10000 = $5938.48 \) amount of interest.
   C) \( A= 10000e^{(0.06)(8)} = 16160.74 \)
   D) \( I= 16160.74 - 10000 = $6160.74 \)

3. Use effective annual rate formula: \( (1 + \frac{r}{m})^m - 1 \)
   A.) \( r=0.061, m=4 \) \( (1 + \frac{0.061}{4})^4 - 1 = 0.0624 \) or 6.24%
   B.) \( r=0.0605, m = 365 \) \( (1 + \frac{0.0605}{365})^{365} - 1 = 0.06236 \) or 6.236%

4. Use Future Value of an Ordinary Annuity formula: \( A = R \left[ \frac{(1 + \frac{r}{m})^{mn} - 1}{\frac{r}{m}} \right] \)
   \( R=150, n=20, r=0.09, m=12 \)
   \[ A = 150 \left[ \frac{(1 + \frac{0.09}{12})^{20 \times 12} - 1}{\frac{0.09}{12}} \right] = $100,183.03 \)

5. Use Future Value formula solved for R:
   \[ R = \frac{A \left( \frac{\frac{r}{m}}{1 + \frac{r}{m}} \right)}{\left( \frac{r}{m} \right)^{mn} - 1} \]
   \( A=30,000, n = 10, m = 4, r = 0.1 \)
   \[ R = 30000 \left[ \frac{\frac{0.1}{4}}{1 + \frac{0.1}{4}}^{10 \times 4} - 1 \right] = $445.09 \] which is the amount of the quarterly payments

6. Use the formula for mortgage payments:
   \[ R = \frac{P \left( \frac{\frac{r}{m}}{1 - \left( 1 + \frac{r}{m} \right)^{-mn}} \right)}{\frac{r}{m}} \]
   A.) \( P=100,000, r = 0.0825, n = 30, m = 12 \)
   \[ R = 100000 \left[ \frac{\frac{0.0825}{12}}{1 - (1 + \frac{0.0825}{12})^{-30 \times 12}} \right] = $751.27 \)
   B.) \( P= 100,000, r=0.0735, n = 15, m =12 \)
   \[ R=918.51 \] (Use same formula as in A.))

7. A.) There were 360 payments of $751.27 each for a total of 360×751.27 = $270,457.20. Since the loan amount was $100,000 then the total interest was 270457.20-100000= $170,457.20
   B.) 180 payments of $918.51 each for a total of $165,331.80. The total interest in this case is 165331.80 -100000 = $65,331.80
8. Use the present value formula for an ordinary annuity. In 6.A.) the loan was for 30 years. If payments are made for 10 years, then there are 20 years left on the life of the loan.

\[ P = \frac{751.27 \left(1 - \left(1 + \frac{0.0825}{12}\right)^{-20 \times 12}\right)}{\frac{0.0825}{12}} = \$88,170.44 \] is the remaining principal.

9. Use the present value of an ordinary annuity formula with \( R=1000, n=12, m = 12, r=0.09 \)

\[ P = \frac{1000 \left(1 - \left(1 + \frac{0.09}{12}\right)^{-1 \times 12}\right)}{\frac{0.09}{12}} = \$87,871.09 \text{ should be put into the account} \]

10. Sally: ordinary annuity for 10 years and then compound interest for 20 years.

\[ A = \frac{200 \left(1 + \frac{0.11}{12}\right)^{120} - 1}{\frac{0.11}{12}} = \$43,399.63 \]

\[ P=\$43,399.63 \text{ n=20, m=12, r=0.11} \]

\[ A = 43399.63 \left(1 + \frac{0.11}{12}\right)^{20 \times 12} = \$387,776.36 \]

Jim: Ordinary annuity for 20 years

\[ A = \frac{200 \left(1 + \frac{0.11}{12}\right)^{20 \times 12} - 1}{\frac{0.11}{12}} = \$173,127.61 \]

How much did Sally contribute? \( 200 \times 120 = \$24,000 \).

How much did Jim contribute? \( 200 \times 240 = \$48,000 \).